For Teachers

Salt – the good, the bad, and the tasty

Objectives/Competences

Objectives. With this activity, students will:

1. Get to know that salts are a main class of inorganic compounds.
2. Study the origin of salt and the connection of salt with geology.
3. See beautiful salt crystals and study crystals, crystal structure, and even grow their own big salt crystals.
4. Find out that melted salt or aqueous salt solutions are electricity conducting materials and further be introduced to the concept of ionic bonding.
5. Study the many uses of salt, and its positive but also negative role in our health.

Competences: Investigative skills, manipulative skills, communication skills.

Task description

Phase 1

This phase consists of an introductory lesson, during which there will be a discussion in class about the origin of salt from sea but also from mines. It is recommended that the teacher shows to students various real crystals of various colours and geometries (e.g. *sulfur, quartz, and/or amethyst crystals*) *or* photographs of them. The property of melted salt as well as of salt aqueous solutions to conduct electricity will be investigated and contrasted with other non-conducting materials (e.g. sugar). The lesson will be completed with a home study assignment that will consist of three activities (see next Phase).

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Phase 2

In this phase, students must carry out at home three assignments. One is a theoretical about ionic bonding. The other is the study at home of the phenomenon of **crystallisation.** And the third is the planning and setting up of an experimental activity whereby students will grow at home big salt crystals.

Phase 3

In this phase, a number of important theoretical and practical issues will be dealt with in class. The first is theoretical: the study of crystal structure (see teacher's notes about the SOMA approach). The other is the consideration of industrial and everyday uses of salt. Finally, students will be assigned the task to discuss at home and/or schoolmates and friends the role of salt in human health.

Before coming to school, for next class, students must have checked in a supermarket's shelves for various types of salt products, as well as for various additives to salts and for various salt substitutes. The students should write down a list of the additives and the substitutes.

The instructor will also supply students with a sheet containg the following ten statements about the realtion of salt to human health. Some of them are generally true and some are generally false, but there exceptions to the rules. Students must *discuss these at home with their parents or with other relatives or friends.*

1. Salt is responsible for high blood pressure.
2. Not all people are in the same way sensitivity to salt.
3. Decreasing salt intake is general cure.
4. Salt is essential to human body.
5. Hidden salt is bad.
6. Salt is allowed to pregnant women.
7. Products with less added salt are better for everybody.
8. About 6 to 8 grams of salt sufficient to cover for the recommended daily intake.
9. People who are working in high-temperature environments must take more salt.
10. Athletes need salt capsules.

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Phase 4

A discussion will take place in class about the information and knowledge gathered from students about (i) additives to salt, and their purpose; (ii) salt substitutes and their purpose; (iii) the role of salt for health, especially its bad role in raising blood pressure.

Ten statements about salt and health: true or false?

1. **Salt is responsible for high blood pressure: *False*.** Studies of blood pressure have shown that the mean values of blood pressure and the bad effects of high blood pressure are higher in places where salt intake is higher. However, within the same population the relation between salt intake and blood pressure is extremely weak and sometimes does not exist. It seems then that there is a genetic factor – sensitivity to salt –that does not allow the making of generalisations for the connection of salt with blood pressure.
2. **Not all people are in the same way sensitivity to salt: *True***. At present, we don't know the genes that are connected to blood pressure, and further those that make some individuals more sensitive to salt than others. As a result, guidelines to a high-blood pressure population to decrease salt intake appear to benefit in some way about 30% of them. The rest are insensitive to salt.
3. **Decreasing salt intake is general cure: *False*.** Taking many studies collectively, it appears that reduction in salt intake has a limited effect – much less than we thought before. It concerns mainly high-blood pressure, obese, and old-age people. There are epidemic studies that have shown that diets that are rich in fruits and vegetables are acting more against high-blood pressure than reduction of salt intake.
4. **Salt is essential to human body: *True*.** In young people, lack of salt reduces reproduction functions, and in large-age people it affects their cognitive functions. Salt provides the chloride ion that is essential for the production of the basic component of gastric fluid (hydrochloric acid, HCl). So, by means of salt, people get increased amounts of iodine and fluorine (additives to salt) that contribute to healthy thyroid bland and to strong teeth. The addition of iodine in salt, has resulted in facing the problem of thyroid malfunction that was a serious problem in places that are far from sea.
5. **Hidden salt is bad: *True***. Salt is used a preservative of most foods, as well as for better taste. Sodium salts have bacteria-static action, that is they hinder the grow of certain microbes, such as listeria. When reduction of consumption of salt is recommended, we must avoid food that contains a lot of salt, such as salted nuts, chips, or canned food (canned foods contain salt as preservative). So we must be careful to check composition of manufactured foods for salt content.
6. **Salt is allowed to pregnant women: *True*.** With the exception of high blood pressure during pregnancy, or conditions that cause water retention, reasonable consumption of salt does not cause problems to pregnancy. Complete avoidance of salt can cause swelling. In any case, the doctor must give the proper instructions.
7. **Products with less added salt are better for everybody:** False. This applies to certain categories of people, such as people with heart or kidney incompetence, as well as diabetics should not consume much salt. In such cases the use of these products must be under medical attendance.

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8. **About 6 to 8 grams of salt cover for the recommended daily intake: *True***. The World Health Organisation recommends this for people with normal blood pressure, while 5-6 g are for people with high blood pressure. For people who suffer from heart or kidney incompetence, salt intake can be reduced to 4 g (at the doctor's recommendation).
9. **People who are working in high-temperature environments must take more salt: *True***. People who work in high-temperature environments (for example bakery-workers) lose salts through sweating, For this reason it is recommended to add some salt to their diet.
10. **Athletes need salt capsules: *False*.** This is not true for the average athletes who do exercise under one hour. For these, the body undertakes to care about salt intake through food. For athletes who exercise excessively (1-3 hours), some dissolved salt (not capsules) is recommended.

The above information is by *Georgios Panotopoulos*, pathologist and dietician, director of the *Department of Obesity and Diet* at '*Hygeia Hospital'* In Athens, Greece. It was taken from an article in the Greek daily *Kathimerin*i Sunday Magazine 'K', by *Elena Kiourktsi*, Issue No. 17, 9, pp. 40-41, Septemebr 2007.

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